

IN THE CLAIMS

1. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and protrusions on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves formed in the surface by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas.

2. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a frame carrier including: a chip supporting substrate having a plurality of device areas; and a frame member for supporting said chip supporting substrate;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and protrusions on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves formed in the surface by said protrusions; and

the step of dividing and individualizing said chip supporting substrate and said block-sealed portion at the unit of said device areas.

3. (Currently Amended) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and a plurality of protrusions on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said ~~plurality of~~

cavity, and forming a block-sealed portion having a plurality of grooves formed in the surface by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas to assemble a semiconductor device having said plurality of grooves formed in the surface of said sealed portion.

4. (Original) A semiconductor device manufacturing method according to Claim 1,

wherein by using the molding tool having said plurality of protrusions formed in a net shape on said cavity forming face, with said plurality of device areas being covered altogether with said cavity, the molding resin is fed to said cavity to resin-seal said semiconductor chip, and

wherein after said block-sealed portion having said grooves formed in the net shape in the surface by said protrusions was formed, said chip supporting substrate and said block-sealed portion are divided at the unit of said device areas to assemble the semiconductor device having said grooves formed in the net shape in the surface of said sealed portion.

5. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and lattice-shaped protrusions corresponding to dicing lines on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves at the portions corresponding to the dicing lines of the surface formed by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion along said grooves at the unit of said device areas.

6. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and dicing lines on a cavity forming face for forming said cavity and a plurality of corresponding protrusions around said dicing lines;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and

forming a block-sealed portion having grooves formed in the surface at the portions corresponding to the dicing lines and in the inner area by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion along said grooves corresponding to said dicing lines at the unit of said device areas.

7. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a frame carrier including: a chip supporting substrate having a plurality of device areas; and a frame member for supporting said chip supporting substrate;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and lattice-shaped protrusions

corresponding to dicing lines on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves formed at portions corresponding to the dicing lines in the surface by said protrusions; and

the step of dividing and individualizing said chip supporting substrate and said block-sealed portion along said grooves at the unit of said device areas.

8. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is

provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and lattice-shaped protrusions corresponding to dicing lines of a plurality of kinds of semiconductor chip sizes on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves at the portions corresponding to the dicing lines, as corresponding to the plurality of kinds of semiconductor device sizes, of the surface and formed in the surface by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion along said grooves at the portions corresponding to the dicing lines corresponding to the individual semiconductor device sizes at the unit of said device areas.

9. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and a plurality of protrusions on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having a plurality of grooves formed in a direction different from that of the dicing lines in the surface by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas to assemble a semiconductor device having said plurality of grooves formed in the direction different from that of the dicing lines in the surface of said sealed portion.

10. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and protrusions of a plurality of kinds of heights on a cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves of depths different at respective portions formed in the surface by said protrusions; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas to assemble a semiconductor device having said plurality of grooves formed in the surface of said sealed portion.

11. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering the plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and dicing lines on a cavity forming face for forming said cavity and the corresponding protrusions of a plurality of kinds of heights around said dicing lines;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of

device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves formed in the surface at the portions corresponding to the dicing lines and in the inner area by said protrusions such that the grooves at the portions corresponding to said dicing lines are made deeper than the grooves in said inner area; and

the step of dividing said chip supporting substrate and said block-sealed portion along said grooves corresponding to said dicing lines at the unit of said device areas, and assembling a semiconductor device having the plurality of said grooves in the surface of the sealed portion.

12. (Original) A semiconductor device manufacturing method according to Claim 11,

wherein the depth of the grooves formed at the portions corresponding to said dicing lines of said block-sealed portion is made as deep as about one half of the thickness of said block-sealed portion.

13. (Original) A semiconductor device manufacturing method according to Claim 11,

wherein the grooves formed in said inner area of the surface of said block-sealed portion are made so deep as not

to reach a wire loop formed of wires or said conductive members.

14. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate and lattice-shaped protrusions of two kinds of heights on a rectangular cavity forming face for forming said cavity;

the step of resin-sealing said semiconductor chip by feeding a molding resin to said cavity with said plurality of device areas being covered altogether with said cavity, and forming a block-sealed portion having grooves at the portions

corresponding to the dicing lines of the rectangular surface and formed in the surface by said protrusions such that the grooves parallel to the width direction are made deeper than the grooves parallel to the length direction; and

the step of dividing said chip supporting substrate and said block-sealed portion along grooves of two kinds of depths at the unit of said device areas.

15. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate;

the step of forming a block-sealed portion by feeding a molding resin with said plurality of device areas being covered altogether with said cavity, to resin-seal said semiconductor chip;

the step of forming grooves in the surface of said block-sealed portion after said molding resin was set to form said block-sealed portion; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas.

16. (Original) A semiconductor device manufacturing method according to Claim 15,

wherein said grooves are formed in the surface of said block-sealed portion by a dicing blade after said molding resin was set to form said block-sealed portion and before the bump electrodes or the external terminals are attached to said chip supporting substrate.

17. (Original) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of forming a block-sealed portion by resin-sealing said semiconductor chip with a potting resin by applying said potting resin so that a plurality of device areas may be covered altogether on the chip supporting face side of said chip supporting substrate;

the step of forming grooves in the surface of said block-sealed portion after said potting resin was set to form said block-sealed portion; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas.

18. (Original) A semiconductor device manufacturing method according to Claim 1,

wherein said chip supporting substrate is made of a flexible substrate.

19. (New) A method of manufacturing a resin-sealed type semiconductor device, comprising:

the step of preparing a chip supporting substrate having a plurality of device areas;

the step of mounting a semiconductor chip on said device areas;

the step of connecting the surface electrode of said semiconductor chip and the corresponding electrode of said chip supporting substrate through conductive members;

the step of covering said plurality of device areas altogether with a cavity, by using a molding tool which is provided with said cavity for covering said plurality of device areas altogether on the chip supporting face side of said chip supporting substrate;

the step of forming a block-sealed portion having grooves in a surface thereof, including the substep of feeding a molding resin with said plurality of device areas being covered altogether with said cavity, to resin-seal said semiconductor chip; and

the step of dividing said chip supporting substrate and said block-sealed portion at the unit of said device areas.